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ABSTRACT

A review of the literature on cooperative, competitive, and independent reward structures and performance is presented, and conclusions are drawn which reformulate current beliefs about the interaction between reward structure and task structure. A brief theory of reward structure and performance is described, and conditions under which cooperative structures may be more effective than competitive ones are outlined. A review of the literature on reward structure and social connectedness strongly suggests that cooperative reward structures may have considerable utility in increasing attractions and reducing hostility between students. A technique which has had positive effects on both academic performance and social connectedness, Teams-Games-Tournament (TGT), is described, and suggestions are made for a direction for further research. (Author)

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CLASSROOM REWARD STRUCTURE: AN ANALYTICAL AND PRACTICAL REVIEW

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U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Introductory Statement

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through three programs to achieve its objectives. The Schools and Maturity program is studying the effects of school, family, and peer group experiences on the development of attitudes consistent with psychosocial maturity. The objectives are to formulate, assess, and research important educational goals other than traditional academic achievement. The program has developed the Psychosocial Maturity (PSM) Inventory for the assessment of adolescent social, individual, and interpersonal adequacy. The School Organization program is currently concerned with authority-control structures, task structures, reward systems, and peer group processes in schools. It has produced a large-scale study of the effects of open schools, has developed the Teams-Games-Tournament (TGT) instructional process for teaching various subjects in elementary and secondary schools, and has produced a computerized system for school-wide attendance monitoring. The Careers program (formerly Careers and Curricula) bases its work upon a theory of career development. It has developed a self-administered vocational guidance device and a self-directed career program to promote vocational development and to foster satisfying curricular decisions for high school, college, and adult populations.

This report, prepared by the School Organization Program, presents a theoretical basis for the examination and application of classroom reward structures to increase student task performance and social connectedness.

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Abstract

A review of the literature on cooperative, competitive, and independent reward structures and performance is presented, and conclusions are drawn which reformulate current beliefs about the interaction between reward structure and task structure. A brief theory of reward structure and performance is described, and conditions under which cooperative structures may be more effective than competitive ones are outlined. A review of the literature on reward structure and social connectedness strongly suggests that cooperative reward structures may have considerable utility in increasing attractions and reducing hostility between students. A technique which has had positive effects on both academic performance and social connectedness, Teams-Games-Tournament (TGT), is described, and suggestions are made for a direction for further research.

At various times in the history of social psychology, interest has arisen in the reward structure of the classroom, particularly in the idea of using reward structures that place students in mutual dependence for rewards--cooperative reward structures. Some high points in the study of classroom reward structure were publications by Deutsch (1949a, 1949b), who presented a comprehensive theory of cooperation and competition, Miller and Hamblin (1963), and Johnson and Johnson (1974). Of there, only Johnson and Johnson (1974) reviewed the large body of research that has been done on cooperative, competitive, and individual reward structures, but this review, described by the authors as more of a polemic for cooperation in classrooms than an objective presentation of findings, was lacking in analysis of these findings. The present paper attempts to fill this gap by drawing theoretical and practical conclusions from the research on reward structures.

DEFINITIONS

The reward structure of a classroom refers to the rules under which students are rewarded for academic performance. The term interpersonal reward structure may be used to refer to the dependence (or lack of dependence) of any given student on any other for rewards in the classroom or other performance setting. For instance, if one student's receipt of rewards dimishes the probability that another will also be rewarded, the students are operating under a competitive reward structure. In a chess game, for example, one player's winning necessitates another's losing. "Grading on the curve" is also a

competitive reward structure. If one student works especially hard to make an "A", and the number of A's is fixed, then that student's performance reduces the probability that other students will also receive A's. If the probability of one student's receiving a reward is unrelated to the probability that any other student receives a reward, the students are in an independent reward structure, as in individualized instruction or any setting in which there are fixed performance criteria for reinforcement. Finally, if an increase in the performance level of any student increases the probability that another will receive rewards, the students are in a cooperative reward structure. Most team sports include this sort of structure within the team; for example, on a football team extra practice by a guard improves the chances that the quarterback or any other player will be reinforced (by winning), and vice versa. Cooperative reward structures may be further broken down into group competition, in which one team's performance is evaluated in relation to the performance of another team or teams, and group contingencies, in which the group is evaluated against a fixed standard.

There is an important distinction between the terms "competitive and cooperative reward structure" and "competition and cooperation." A cooperative reward structure describes a set of rules governing allocation of rewards, not a set of behaviors. Cooperation (i.e. collaboration, coordination of efforts, etc.) might be one outcome of this particular set of rules. Similarly, competition might be an outcome of a competitive reward structure, but it is also a dependent variable whose occurrence must be documented.

INTERPERSONAL REWARD STRUCTURE AND THE CLASSROOM

There has been a long tradition of research in social psychology on the effects of different reward structures on performance, attitudes, and interpersonal process, with interest in these structures focusing on their potential use in industrial and educational settings. Much of the interest in classroom reward structure has been motivated by a vision of a society in which students help one another and thus become helping, interpersonally capable adults. That is, the interest has been primarily in cooperative reward structures as an alternative to existing competitive structures. However, educational innovations have usually had to "sell" themselves on their merits with respect to academic performance, just as industrial innovations must increase production. Consequently, the majority of studies on interpersonal reward structure have focused on some performance measure. On the surface the results of these studies appear to be mixed and contradictory, but closer examination of the literature suggests that cooperative reward structures (despite their other benefits) appear (at least from the evidence of laboratory, or laboratory-like studies) to be no more effective than competitive or independent reward structures in increasing performance which makes up the bulk of classroom tasks.

Reward Structures and Task Performance

Part of the confusion around the relationship of reward structure to performance may stem from a lack of consistency of tasks and dependent variables across studies. Miller and Hamblin (1963) advanced the idea that there was an interaction between reward structure and

task structure--that cooperative reward structures are associated with greater performance than are competitive and independent reward structures when the group task is an interdependent one (i.e. could not be performed by a single individual), but are associated with less performance when the task does not require coordination of efforts. The well-known Deutsch (1949) studies are examples of the use of task interdependence--the group task, discussion of human relations problems, could not have been performed satisfactorily by a single individual. In contrast, an independent task was used by Scott and Cherrington (1974), who had their groups coding questionnaire responses, a task which does not require more than one person.

Miller and Hamblin's distinction between interdependent and independent tasks explained the inconsistent findings in numerous studies, and made sense out of the confusing relationship between cooperative and competitive reward structures and performance. The Miller and Hamblin classifications of studies clearly differentiated studies such as those by Deutsch (1949) and Smith et al., (1957), from studies such as those by DeCharms (1957), Phillips (1954), and Sims (1929). In the first group of studies, the tasks were group discussions, and cooperative reward structures were associated with greater group productivity than were competitive structures. The second group of studies used purely mechanical tasks, and the opposite relationship between reward structure and performance was observed. Miller and Hamblin reported an experiment specifically designed to test their hypothesis of an interaction between task interdependence and reward structure.

They gave three-person groups the task of guessing which of 13 numbers had been selected by the experimenter. Each group member was told four different numbers that had not been selected. Thus, if the group members shared their clues, they could discover which number was missing. In the task interdependent conditions, a penalty was attached to guessing wrong, making sharing of clues the most effective strategy. In the task independent conditions, there was no penalty for for guessing wrong, so the most effective strategy was to guess numbers as quickly as possible. The results of the study confirmed the authors' hypothesis involving the interaction of type of task with reward structure. In the task interdependent condition, the greater the degree of differential rewarding (i.e., the more one person in the group was rewarded at the expense of the others for getting the right answer), the worse the performance, while in the task independent condition no such relationship was observed.

Most of the studies since the Miller and Hamblin article or not cited by them have conformed to their categories. Raven and Eachus (1963) and Crombag (1966) used a task in which each subject's score was entirely dependent on the behavior of two teammates, and found far superior performance in subjects under a group reward contingency over those under an individual contingency. Hammond and Goldman (1961), Haines and McKeachie (1967), and Laughlin and McGlynn (1967) demonstrated greater group productivity in cooperative discussion groups than in competitive ones, while Scott and Cherrington (1974) have shown the opposite relationship with an independent task. However,

several studies contradict the expectations of the Miller and Hamblin article. An examination of these discrepant studies should lead to a more refined and plausible theory to account for the different effects of cooperation and competition on performance.

One study not cited by Miller and Hamblin appears to contradict their formulation. Klugman (1944) compared the performance of pairs of children working under a group contingency with that of children working under individual contingencies. The task was solving arithmetic problems--clearly an independent task. However, the children were told not to worry about time, but to try to get as many of the problems correct as possible. Obviously, the group contingency created a condition in which children would be likely to check each other's work and to "pool" their intellectual resources, and greater accuracy on the problems was in fact observed. Without a time restriction, the "group" product was probably much like that which the more able students would have produced alone.

In another article not cited by Miller and Hamblin, Thomas (1957) specifically varied reward and task dependence. He contrasted the productivity or workers working on a "double assembly line" (task interdependence) with that of workers who completed their entire tasks independently. The reward dimension contrasted a group contingency with an individual contingency. Thomas found no differences on the reward dimension, and interaction between reward and task. In fact, the trend in his data was toward an interaction effect opposite

in direction to that reported by Miller and Hamblin. In a more recent but similar study, Weinstein and Holzbach (1972) specifically varied reward and task structures around a simple coding task. Half of their subjects worked on an 'assembly line' and the other half worked in groups but on independent tasks. In this study, group competition structure was associated with greater performance under both task conditions and no reward and task interaction was indicated.

Reward Structure and Performance: A Reformulation

Apparently, Miller and Hamblin's treatment of the problem of task and reward structure and performances does not adequately explain the findings regarding these dimensions. What follows is an attempt to account more completely for the observations of such diverse results in studies of reward structure.

One way of looking at reward structure and performance is using constructs from an expectancy theory, which holds that motivation to perform a given behavior is a product of the probability of reinforcement given effort, and the incentive value of the reinforcer to the performer (Atkinson, 1958). That is, motivation to perform a task is highest when it is very likely that a reward will follow task performance, and when that reward is highly desired. [(Expectancy theory has been reviewed recently by Kukla (1962)].

According to expectancy theory constructs, pure cooperation, in the sense of mutual dependence between persons for reward, is a rather inefficient reward structure. Imagine subjects working in separate

rooms unaware of each other, each receiving one reinforcer for one piece of work (an independent reward structure). Then imagine a new contingency; each of two subjects receives reinforcers equal to half of their combined total. While the correlation between behavior and reinforcement has been 1.00, it now drops to .71 ($1/\sqrt{2}$), assuming equal variance, for each of the two subjects. With three subjects, the correlation between behavior and reinforcement would be .58 ($1/\sqrt{3}$), and so on. Each individual's performance explains only 50% and 33%, respectively, of the variance in the group score. That is, sometimes subjects get reinforcement when they have not performed well; sometimes they get little reinforcement for large increases in performance. These decreases in correlations between effort and reinforcement are, of course, decreases in the probability of reinforcement given effort, and increases in the probability of reinforcement given no effort. Holding incentive value of reinforcement constant expectancy theory would thus predict decreased motivation to increase effort, and increased motivation to reduce effort. In this "separate rooms" experiment, increasing the number of subjects under the group contingency would thus decrease the performance level of all of the subjects.

Competition, on the other hand, can be a very efficient reward structure whether the competitors are in "separate rooms" or not. In a competition between two people of roughly equal ability, any increase in an individual's performance level may pay off in a markedly increased probability of success, while a decrease may significantly

hurt the chance of winning. In competition between more than two persons of equal ability, the same principles hold, assuming the rewards are neither so available that nearly everyone is rewarded regardless of effort, nor so scarce that chances of being rewarded are slim for everyone. However, when competitors are poorly matched on ability, increments in performance level by either competitor do not increase their probabilities of success, as the outcome is largely predetermined. Traditional grading practices resemble this condition, as there are many students who cannot make acceptable grades (A's and B's) regardless of effort, while other students can hardly avoid getting these grades. However, in the small "separate rooms" situation described above, if the subjects are even roughly equivalent in ability, competition will be an effective motivational structure.

However, none of the research cited above has placed subjects in separate rooms. Subjects in all of the studies performed in each other's presence. What makes cooperative reward structures unique is the way in which they encourage subjects under the same contingency to behave so as to facilitate the production of other group members, that is, to cooperate.

At least two principal means are available to group members to improve the performance of other group members. The first is to provide reinforcers to group members based on their individual performance (or to threaten sanctions for poor performance). While the correlation between individual task performance and individual outcome from the external contingency structure may be low in a cooperative reward

structure, the reinforcement from group members may be closely tied to individual behavior, depending on awareness within the group of individual performance and opportunities for effective reinforcement of task behavior. That is, under certain circumstances, a highly contingent reinforcement contingency set up by the group may supplement the less contingent cooperative reward structure. The occurrence of mutual reinforcement for task behavior in cooperative groups has been indirectly documented by Thomas (1957) as "responsibility forces," or pressures by group members toward group productivity, and by Slavin et al. (1975), who found a higher correlation between sociometric status gains and performance in cooperative than in competitive groups. However, although within-group reinforcement for task performance appears to be important in explaining the effectiveness of cooperative structures, especially over long periods, opportunities for such reinforcement exist in nearly all of the studies reviewed here, including studies in which individual competition was more effective than cooperation in increasing performance.

The second means that group members may have to improve performance of other members is the ability to share resources that either reduce the costs to group members of performing or otherwise facilitate a high level of performance. For instance, in a cooperative group doing individual social studies projects, a group member might share information about some aspect of the project, thus freeing the other group members from having to find that information and possibly improving their individual products.

While most studies of cooperation and competition have allowed for the occurrence of teammate reinforcement for academic performance, many have not provided any opportunity for improving group performance by means of resource sharing among group members. It will be argued here that the presence or absence of such opportunities, not task independence versus task interdependence, is the determining characteristic that separates experiments in which cooperative reward structures are more effective than competitive ones in motivating task performance from experiments in which the opposite is the case.

The Miller and Hamblin experiment provides an excellent case in point. As described above, they provided each of three group members with four numbers that were not the target number. These numbers were thus a powerful resource for the group. As would be expected, the groups under cooperative reward contingencies quickly pooled their information; with a heavy guessing penalty, there was no other effective strategy, and no reason to withhold information. In the competitively structured groups, however, there was a definite motivation to withhold information, but at the same time to try to get other group members to contribute their information. Not surprisingly, the competively structured groups were much slower than the cooperative ones in finding the target number. On the other hand, in the task independent condition, in which subjects made guesses as quickly as possible, the information resources of each subject were of little use, and no differences were found among reward contingencies. The group discussion problems, like those used by Deutsch (1949) can also be

seen as "resource sharing" situations. In them students could either share or withhold ideas, facilitation of group process, and support for others' ideas, depending on the contingency structure. That is, subjects are able to make a choice of whether to cooperate or compete, and that choice influences group productivity.

The "opportunity for improving performance by sharing resources" distinction makes sense out of the studies not conforming to the Miller and Hamblin division. A particularly relevant case is that of Klugman (1944), who found cooperation more effective than individual contingencies in arithmetic performance. DeCharms (1957) found exactly the opposite relationship in a nearly identical task. However, Klugman asked his subjects to concentrate on accuracy, while DeCharms asked his subjects to concentrate on speed. With all the time they needed, the Klugman subjects could pool their individual knowledge of arithmetic facts (a resource) when they were motivated to do so by a cooperative reward structure. DeCharms' subjects, working as fast as they could on individual problems, had no relevant resources to share, regardless of reward structure. In this experiment, the relative efficiency of the competitive reward structure was probably responsible for the superiority of that structure over the inefficient cooperative one.

The Thomas (1957) and Weinstein and Holzbach (1972) results are also easily accounted for by a resource-sharing model. They both varied assembly line and independent tasks, calling the assembly line structures "task interdependent." Task interdependent they may be,

but they offer no opportunities for improving performance by sharing of resources. As a consequence, no differences were found in either study between the task structures within reward contingencies.

Johnson and Johnson (1974), in a review of the literature on cooperation and competition, attempted to draw a distinction between "problem solving" and mechanical, repetitive tasks as the crucial one for determining when cooperation is likely to be more effective than competition in increasing performance. They imply that, as most school tasks require some problem solving, the great majority of school time should be spent in cooperative, rather than competitive interaction. However, the studies they cite as involving "problem solving" tasks involve either group discussion or puzzle solving. Neither of these activities lend themselves to the learning of basic skills in schools, and neither occupies a significant amount of time in school curricula. Although the evidence from laboratory research on reward structure strongly supports the use of cooperative structures to improve the social atmosphere of the classroom, no such evidence suggests a benefit in learning of essential skills for such structures.

Even when significant positive effects for cooperative reward structures have been demonstrated for group-level productivity measures, corresponding results have not been found on subsequent cognitive performance. For instance, Haines and McKeachie (1967) found that psychology students in large discussion groups covered a greater number of questions under a cooperative structure than under a competitive one, but the groups did not differ in examination perfor-

mance. Similarly, Smith et al., (1957) found more ideas expressed in a cooperative discussion group than in a competitive one, but was unable to demonstrate differences in recall of the material discussed. Thus, no laboratory or laboratory-like study has demonstrated a cognitive performance superiority for a cooperative reward structure.

However, the laboratory is an exceptionally poor simulation of the classroom for purposes of research on reward structures. As suggested earlier, cooperative structures must either promote interpersonal motivations for task performance or create conditions in which subjects will facilitate each other's performance to compensate for diminished correlations between individual behavior output and rewards received. As also noted, it is apparently the presence of opportunities to share resources to facilitate performance that differentiates studies in which cooperative structures produce greater performance than competitive ones from studies in which the opposite occurs. However, all of the studies cited above in which competition was a better structure for performance than cooperation took place in laboratory or laboratory-like settings in which subjects were typically strangers and the cooperative groups existed for a short time. Under such conditions, there is little reason to expect that teammate pressures for performance could even begin to develop, much less take effect. Thus, to generalize from the laboratory to the classroom in this particular case would appear to be inappropriate.

Reward Structure and Performance: Classroom Research

Several recent classroom studies in the operant psychology literature have demonstrated the effectiveness of group contingencies for motivating certain behaviors. A large body of research in this area was recently reviewed by Litow and Pumroy (1975). These studies have typically taken place over periods of several weeks. Classroom noise was effectively reduced by means of a group contingency in which class rewards followed maintenance by the entire class of a certain noise level (Schmidt and Ulrich, 1969). Barrish et al. (1969) used a team competition approach to reduce inappropriate talking and out-of-seat behavior, and Packard (1970) used a group contingency to increase attention to academic tasks. All of these group contingencies required that all group members emit the same behavior at the same time for the group to be rewarded. However, these studies are of limited interest in the study of reward structure, as in each case they compared a group contingency to no systematic contingency, obviously an unfair comparison.

Three classroom studies have compared individual and group contingencies. Herman and Tramontana (1971) found no difference between these contingencies, but both of their treatments reduced preschoolers' "off mat" behavior during rest time to zero, precluding meaningful comparison. Hamblin et al. (1971) compared five reward contingencies with a group of inner-city children; no contingency, individual contingency, and group contingencies based on

the performance of the average class member, the highest three members, and the lowest three members. All of the reward structures produced greater achievement than the no-contingency condition, but only the low-performer contingency was associated with greater performance than was the individual contingency. Wodarski et al. (1973) replicated the finding of achievement differences between a low-performer group contingency and an individual contingency.

Thus, the Hamblin and Wodarski studies are the only instances in the literature of the comparison of individual and group contingencies placed on academic achievement in an actual classroom setting over a significant period of time. No studies exist which compare cooperative and competitive structures under such conditions. The findings of the Hamblin et al. study are disappointing to those who would wish to introduce group contingencies into classrooms because the structure most likely to be adopted in schools, the average performance group contingency, did no better than an individual contingency in increasing academic performance. However, the Hamblin et al. results should not be taken as a signal to end research on group reward structures based equally on the performance of all group members. In their study, the relevant group was the entire treatment group of 7-9 students. From the point of view of each student, the probability of influencing the class score one way of the other by either increasing or decreasing his or her performance level must have seemed small (in fact, each student's performance would explain only 11-14% of the variance in the team

score). At the same time, social psychologists have long known that both influence and help are transmitted in small, face-to-face groups, much smaller than an entire class. As a result, both peer pressure for performance and peer tutoring in the whole class contingency may have been diffuse. In contrast, in the low-performer contingency, the class' attention was probably focused on the four-to-five students who might have been candidates for "low performer." Both the low-performers themselves and their tutors would be likely to learn a great deal from this structure, in which the task, improving the scores of a small number of students, was unambiguous. Also, the experimental treatments lasted only three weeks--probably enough time for the peer tutoring to take effect, but not enough for peer norms supporting academic performance to develop.

However, the same effects could be achieved, at least in theory, by having group contingencies apply to the average performance of small, ability-heterogeneous teams within the class over a longer period of time. In such groups, the question of who to attempt to motivate and who to tutor would be at least as unambiguous as in the Hamblin and Wodarski low-performer contingency and peer norms would have time to develop. Groups of this type have been effectively used in the research on Teams-Games-Tournament, which is described below, but this technique has employed face-to-face individual competition as well as within-team cooperation. If a pure cooperative reward structure is to be effective in increasing performance, reinforcement at the small group level and longer treatment duration

would appear to be one fruitful avenue for future research.

Reward Structure and Social Connectedness

While the relationship between reward structure and task performance is a subject of debate, the relationship between reward structure and a wide range of social dimensions is not. These social dimensions include interpersonal attraction, friendliness, positive group evaluation, helpfulness, and other related variables which will be subsumed here under the label "social connectedness," that is, the degree to which an individual feels attracted to others, and feels and acts a part of a valued group. The research evidence clearly supports a conclusion that cooperative reward structures are much more positively associated with "social connectedness" than are either competitive or independent reward structures, and it is particularly these results that have motivated the search for cooperative structures that are additionally effective in improving performance.

The positive relationship between cooperative structure and social connectedness apparently holds regardless of the effect on performance. Julian and Perry (1967), who found individual competition a more effective reward structure than either group competition or group contingencies, observed the opposite order of effects on social-emotional tone, willingness to work with the same team again, and individual feeling of responsibility for group performance. Scott and Cherrington (1974) observed a similar pattern; individual competition produced the greatest performance, but a group contingency

produced the greatest interpersonal attraction.

Increases in mutual attraction as a consequence of a cooperative reward structure have been obtained by Deutsch (1949), Dunn and Goldman (1966), Gottheil (1955), Grossack (1968), Jones and Vroom (1964), and Myers (1962). These studies have employed different group sizes, tasks, ages, and durations, yet the finding of greater interpersonal attraction in cooperative than competitive structures has persisted. Similar findings with respect to cohesiveness and attraction to group have been reported by Crombag (1966), Mizuhara and Tamai (1952), Phillips and D'Amico (1956), and Raven and Eachus (1963). Deutsch (1949) showed groups in team competition to be more friendly and helpful than those in intragroup competition. Dunn and Goldman (1966) observed a more positive emotional state and found more positive or supportive statements in two cooperative conditions than in either an individual or a competitive condition. Stendler, et al. (1951) found a similar positive work and play atmosphere in a group contingency as compared to individual competition. Also, group members report greater satisfaction and motivation in cooperative reward structures than in individual or competitive ones (Crombag, 1966; Fiedler, 1967; Haines and McKeachie, 1967; Jones and Vroom, 1964; Raven and Eachus, 1963; Weinstein and Holzbach, 1972).

In other words, abundant evidence exists to portray the cooperative setting as one characterized by a positive, mutually supportive group climate. That this climate may result in subjects' feelings of increased social connectedness has also been well documented.

However, a few studies have gone beyond these social dimensions to show a benefit of cooperative reward structures for individual-level outcomes that are not so clearly related to social connectedness. Prominent among such efforts is the work of Fiedler and his colleagues, who investigated the "quasi-therapeutic" effects of group competition. In a series of studies done over periods of time much longer than the usual laboratory experiments, they were able to demonstrate positive effects of group competition on self-esteem, lack of anxiety, self-rating as responsible and capable, and emotional adjustment in combat engineering companies (Julian, Bishop, and Fiedler, 1966; Fiedler, 1967). Myers (1962) demonstrated similar effects in recreational rifle teams.

Various explanations have been offered for the consistent social benefits produced by cooperative reward structures, but most have revolved around a single observation; that people like, help, and reinforce others who facilitate their own goal attainment. This phenomenon has been observed by Berkowitz and Daniels (1963), Goranson and Berkowitz (1966), and Secord and Backman (1964). On the other hand, people who are seen as opposing goal attainment are disliked (Burnstein and Worchel, 1962; Johnson and Johnson, 1972). A related explanation is that groups increase in cohesiveness and express greater mutual attraction when faced with an external "threat," given that they have a cooperative option open to meet the threat (Hamblin, 1958; Lanzetta et al., 1954; Lanzetta, 1955; Mann and Mann,

1959; Sherif and Sherif, 1953).

It is particularly the effects of cooperative reward structures on social connectedness that make the search for effective cooperative structures important, perhaps imperative. One example of the potential of such reward structures to affect important social dimensions is the effect they have on cross-racial interaction. In a recent symposium at the American Psychological Association, three independent research teams reported impressive effects of cooperative reward structures on such dimensions as interracial friendships, positive interracial attitudes, interracial helping on school tasks, and reductions in interracial conflict (Aronson et al., 1975; DeVries and Slavin, 1975; Weigel et al., 1975). If team reward structures can improve relations between the races, it would seem likely that their use could also be an aid in reducing both cross-race and within-race school violence, a problem of mounting concern in schools everywhere. In fact, it would not be unreasonable to expect that any social or academic benefit that would profit from greater interpersonal attraction or "connectedness" between students could be achieved with the use of cooperative reward structures.

Teams-Games-Tournament

However, the implications of the research to date on cooperation and competition for classroom practice are somewhat disheartening for those who would wish to simultaneously improve academic performance and social connectedness among students. The conclusions that can be

drawn from the research seem to force a choice between these outcomes.

One classroom technique does exist which combines cooperative and competitive reward structures, and has had simultaneous positive effects on both academic performance and social connectedness. This technique, Teams-Games-Tournament, or TGT, involves having students compete at three-person, ability homogeneous "Tournament Tables" on simple academic games. Students then contribute their individual scores to a team score. The teams are composed of five students who are heterogeneous on ability, and teammates have an opportunity to prepare each other for the tournaments. Thus, TGT combines a competitive contingency (the tournaments) with a cooperative one (the teams).

Research on TGT has demonstrated positive effects of this technique on junior high school mathematics achievement as compared to control classes (Edwards, DeVries, and Snyder, 1972; Edwards and DeVries, 1972; Edwards and DeVries, 1974; Hulten, 1974) and on third grade language arts achievement (DeVries and Mescon, 1974; DeVries, Mescon, and Shackman, 1975). At the same time, TGT has had positive effects on such social connectedness variables as number of friends in school (DeVries, Edwards, and Wells, 1974b; Slavin, 1975), cross-race and cross-sex friendship choices (DeVries and Edwards, 1974; DeVries and Slavin, 1975), mutual concern and cohesiveness (DeVries and Edwards, 1973; Edwards and DeVries, 1974; DeVries, Edwards, and

Wells, 1974b) and frequency of peer tutoring (DeVries and Edwards, 1973; Edwards and DeVries, 1974; DeVries, Edwards, and Wells, 1974b; DeVries and Mescon, 1974; DeVries, Mescon and Shackman, 1975; Slavin, 1975). In addition, TGT has had positive effects on the "normative climate" of the classroom -- students' expectations for their classmates' academic performance and their reactions to those students who are seen as academically successful (Edwards and DeVries, 1974; DeVries, Edwards, and Wells, 1974a; Hulten, 1974; Slavin, DeVries, and Hulten, 1975).

The results of the research on TGT indicate that the dilemma of cooperative reward structures and social connectedness versus competitive ones and academic performance is not an insoluble one, but may be resolved by means of a mix of these contingencies. However, TGT has been most successful in motivating achievement in fairly concrete subjects--mathematics and language arts. It has been no more successful than traditional instruction when it has been used in social studies (DeVries, Edwards, and Wells, 1974a; Edwards and DeVries, 1974; Slavin, 1975). As a consequence, there is still considerable room for research on reward structures for the classroom. The literature to date seems to point to mixed cooperative and competitive reward structures as one important (but largely unexplored) area for further research to discover techniques for maximizing student achievement and social connectedness.

In reviewing the work done up to the present time on interpersonal reward structures, an attempt has been made to make the following major points:

1) Contrary to current beliefs, the laboratory or laboratory-like research on interpersonal reward structure supports a conclusion that, unless subjects have important resources to share or withhold at their discretion, competitive and individual reward structures are more effective than cooperative ones for increasing performance.
2) Classroom research comparing the effects of different reward structures on performance has been scant, but there is reason to believe that further research with certain kinds of small group cooperative structures may yet produce achievement gains for such structures.
3) Consistently positive effects of cooperative reward structures on social connectedness dimensions point to an important reason for continuing the search for effective cooperative reward structures -- that it may be possible to permanently change the climate of the classroom in a way that promotes mutual attraction and acceptance among students.

One particular classroom reward and task structure, Teams-Games-Tournament, was described as one approach that appears to have promise for the production of both increased academic performance and social connectedness among students. Other, perhaps simpler structures could doubtless be designed to the same ends. What is required is an innovative but, most importantly, scientific approach to the use of

cooperative structures in the classrooms. The research has clearly shown that not all cooperative structures lead to performance gains. It is the belief of this author that cooperative structures which produce social benefits at a cost in academic performance will not, and probably should not, gain wide acceptance in schools. The research has demonstrated that these goals need not be incompatible; the task that remains is to find further workable cooperative structures for the classroom that simultaneously improve the academic performance and social connectedness of students.

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